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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,118	05/19/2006	Bhanu Prakash Kirgaval Nagaraja Rao	L2005 0022/P022	7431
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/580,118

Applicant(s)

NAGARAJA RAO ET AL.

Examiner

NANCY BITAR

Art Unit

2624

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-85/86)
- Paper No(s)/Mail Date 3/23/2009
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's response to the last Office Action, filed 12/23/2008, has been entered and made of record.
2. Applicant has amended claims 4-8, 11-13. Claims 4-13 are currently pending.
3. Applicants arguments filed 3/23/2009 have been fully considered but they are not persuasive.
4. Applicant argues that Verard does not disclose or suggest either feature (i) or feature (ii) of claim 4. Verard discloses that the positions of the PC and AC landmarks are found using a step-by-step procedure performed on a midsagittal image (Verard, Fig. 2(b) caption). Moreover, Verard only teaches steps which operate on a midsagittal image and does not teach or suggest using the coarse localization of the PC to generate one or more axial or coronal radiological images. Moreover, Sun (in particular Fig. 3 and the caption cited by the Examiner), the axial and coronal slices of AC and PC are only used for labeling with the help of Talairach's atlas, and are not used to improve the estimated position of the AC or the PC landmark. Indeed, Sun does not disclose or suggest that the axial and coronal slices can be used to improve the estimated positions of the AC or PC landmarks.

In response, Verard teaches a fully automated identification of AC and PC landmarks in the brain using MRI where the method includes the step of taking midsagittal image of the brain and setting an initial threshold of the pixel intensity, and then iteratively modifying threshold

levels until successful identification of brain structures such as the AC and PC (page 613 column 2 lines 5-19 and page 614 column 2 lines 6 to page 615 column 1 line 24). Applicant argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e.: using the coarse localization of the PC to generate one or more axial or coronal radiological images) are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993) Sun clearly teaches the deficiency of Verard where the automatic method of finding the anterior commissure (AC) and posterior commissure (PC) by estimating the position of midsagittal radiological images and generating axial radiological images and analyzing these to improve the estimate of the position of the landmark (figure 3 and caption). Therefore feature (ii) of claim 4 has been addressed by SUN et al. Additionally the applicant's argument that the combination of all the features recited in claims 4-13 makes the applicant's invention patentable different is not found persuasive and thus Kondo still reads on the applicant's claimed invention. All remaining arguments are reliant on the aforementioned and addressed arguments and thus are considered to be wholly addressed herein.

Examiner Notes

5. Examiner cites particular columns and line numbers in the references as applied to the claims below for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that,

in preparing responses, the applicant fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4-10,12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verard et al (Fully automatic identification of AC and PC landmarks on brain MRI using scene analysis) and Sun et al (Anatomic labeling of PET brain images with automatic detection of AC and PC)

As to claims 4 and 6, Verard et al teaches method of estimating the position of the AC and/or PC landmarks which includes:

(a) using a midsagittal radiological image to estimate the position of the AC or PC landmarks in the midsagittal plane (page 613, column 2,);

(b) using the estimated position of the AC or PC landmarks to generate one or more axial or coronal radiological images, including at least one image including the estimated position of the AC or PC landmark (*Localization of the PC and the AC*:

Identification of the superior Co allows one to draw [Fig. 2(b)] a small window (approximately 1 cm) which includes the PC with certainty. Two convolution masks designed for a 1.5 mm voxel size [Fig. 7(a)] are applied independently to the pixels located inside this window. The first one is a directional edge enhancement filter, while the second one acts as a template modeling of the typical grey-level intensity variations close to the PC. Finally, an operation of multiplication of the resulting images is carried out whose maximum value provides a coarse localization of the PC. This coarse position is fine grained by application of a second matched filter inside a smaller region, centered on the previously found the PC position and zoomed by bicubic interpolation, page 614, column 2, lines 6-35); While Verard meets a number of the limitations of the claimed invention, as pointed out more fully above, Verard fails to specifically teach use of misdagittal images to improve the estimate of the position of the AC or PC landmarks . Specifically, Sun et al. automatic method for finding anterior commissure (AC) and posterior commissure (PC) in positron emission tomography (PET) brain image without a reference image is discussed. For labeling and localizing] anatomical structures, a PET image aligned in parallel to the detected AC-PC line is normalized spatially into the corresponding trans axial Talairach brain. Moreover, Sun et al teaches estimating the AC and PC positions on misdagittal radiological images and generating axial radiological images and analyzing these to improve the estimate of the position of the landmarks (figure 3 and caption) it would have been obvious to one of ordinary skill in the art to estimate the positions on misdagittal radiological images in order to make the clinical evaluation images easier, fast and accurate .Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

As to claim 5, Verard et al teaches the method according to claim 4 in which the images are axial images, and step (c) includes deriving a mean ventricular line (MVL), and determining the position of the AC or PC landmarks by scanning intensity values along the MVL (The mean of differences between automatic calculation and manual pointing was close to zero and the standard deviation is established at about 0.35 for both axial and coronal angulations, page 615, column 1 line 24, column 2 lines 1-45)

As to claim 7, Verard et al teaches the method according to claim 4 in which the images are coronal images, and step (c) includes deriving a symmetry line within a first coronal image including estimates of the position of the AC or PC landmarks, and determining the position of the landmark by scanning intensity values along the symmetry line (to provide a better intensity contrast, especially in the AC and PC vicinities, we decided to operate on a pseudo midsagittal image, obtained by assigning to each pixel the lower value in grey-level intensity from the midsagittal and its two adjacent planes, page 613, column 2)

As to claim 8, Verard et al teaches the method according to claim 7 in which there are a plurality of images relating to different coronal slices including second images of coronal slices neighboring the first coronal slice, the method further including the step of determining dimensions of the AC or PC landmarks using the second images (The parameters of the ellipse (center coordinates, axes dimensions and , angle) can be easily calculated with a least mean square algorithm with 16 points of a transaxial brain slice contour on a binary image by employing a threshold, which is not critical since it may range between three and 20 times the background grey level, page 612, column 1)

As to claim 9 and 10, Verard method according to claim 4 in which the landmark is the AC and the landmark is the PC (To localize the AC and the PC, we use a step-by-step scene analysis which allows one to gradually converge, first to PC then to AC, as illustrated in Fig. 2(b), page 611, column 1)

The limitation of claims 12-13 has been addressed above.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verard et al in view of Nowinski et al (WO 02/43003)

While Verard meets a number of the limitations of the claimed invention, as pointed out more fully above, Nowinski fails to specifically teach generating a first estimate of the position of the landmark as a point on the identified structure wherein the structure is the formix and the landmark is the anterior commissure (AC)

Specifically, Nowinski et al. teaches a system for analyzing a brain image compares the image with a brain atlas, labels the image accordingly, and annotating the regions of interest and/or other structures. This atlas-enhanced data is written to a file (or more than one file) in the Dicom format or any web-enabled format such as SGML or XML format. The image used may be produced by any medical imaging modality. A fast algorithm is proposed for a landmark-

based piecewise linear mapping of one volumetric image into another volumetric image. Furthermore, a new set of brain landmarks are proposed, and algorithms for the automatic identification of these landmarks are formulated for three orientations, axial, coronal, and sagittal. Nowinski clearly teaches the generating a first estimate of the position of the landmark as point on the identified structure wherein the structure is the fornix and the landmark is the anterior commissure (figures 4-7A, 7C, and 12) it would have been obvious to one of ordinary skill in the art to identify the structure as the fornix and the AC in Verard et al in order to enhance the accuracy of identification by using a robust and efficient algorithm. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nancy Bitar/
Examiner, Art Unit 2624

**/VIKKRAM BALI/
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